

**PROXIMA B**

– POTENTIALLY HABITABLE, AND RIGHT ON OUR DOORSTEP!



Just over 20 years ago, the only planets we knew of were those in our solar system orbiting the Sun. Since then, astronomers have discovered thousands more planets orbiting distant stars.

Many are gas-shrouded giants like Jupiter. That's not the kind of planet where we would expect to find life as we know it. To support life, a planet would need to be more like our Earth.

Turns out there is a suitable candidate right on our doorstep.

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On August 24, an international team of scientists reported they had found a potentially habitable planet orbiting the closest star beyond our solar system.

"For more than 20 years the history of **exoplanets** has been defined by studying the stars tens to hundreds of light-years away. [But] the **holy grail**

ABOUT STARS AND PLANETS

Stars are the building blocks of galaxies. Our Milky Way galaxy alone has about two hundred billion of them.

A star is a big ball of gas held together by gravity. Its extremely hot core produces energy. Some is released as light, making the star glow.

Stars are different colours and temperatures. They range in size, too, from dwarfs to supergiants. Our Sun, the center of our solar system, is a yellow star of average temperature and size.

Planets are round objects that orbit stars. They are likely formed from the disc-shaped clouds of gas and dust left over from a star's birth.

Astronomers now estimate that fifteen to thirty percent of the stars in our galaxy could have planets orbiting them in the Goldilocks zone.

– a small, rocky, potentially habitable planet – was just waiting to be discovered around our closest neighbour," says astronomer Debra Fischer.

**DISCOVERING
A "WOBBLE"**

British astronomers Guillem Anglada-Escude and Mikko Tuomi led the hard-working team that discovered Proxima b.

"People seem to think we just found the planet. But we believed it was there for years," said Dr. Anglada-Escude. "We just had to build an argument to convince others it exists."

Orbiting planets give their stars a slight but distinctive "wobble." Using a precise instrument mounted on a telescope in Chile, Dr. Anglada-Escude's team detected this signal from

DEFINITIONS

EXOPLANET: a planet that orbits a star outside the solar system

HOLY GRAIL: something that you want very much but that is very hard to get or achieve



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Proxima b's star, Proxima Centauri. The team then confirmed its findings using other telescopes.

THE GOLDBLOCKS ZONE

Proxima Centauri is about one-thousandth as bright as our sun. It is a small star called a red dwarf. Proxima b orbits just 7.5 million kilometres away from it – much closer than the Earth is to the Sun. Yet Proxima b's temperatures are not too hot. It is in the so-called Goldilocks zone, where conditions are “just right” for life-giving liquid water to form on its surface.

As well, its mass is about one-third more than the Earth's. This suggests it is rocky, with a solid surface where oceans could pool. It also has Earth-like gravity; if people lived there, they wouldn't be crushed or float away.

Still, humans would not find living on Proxima b pleasant. One side is bathed in light, the other is always dark. The planet is also vulnerable to violent **solar flares**. But other organisms might survive there, so the search for life is on.

ZEROING IN

One problem? Even though Proxima b is close to Earth in astronomical terms, it is still

4.4 light years – or 40 trillion kilometres – away. Today, a spacecraft would have to travel 75,000 years to reach it. So how can we learn more about this exciting find?

Planet hunters hope Proxima b's orbit will cross the face of Proxima Centauri as viewed from Earth. That would cast a tiny, measurable shadow on our instruments. We might be able to use this information to confirm whether the planet has the protective **atmosphere** needed for a life-friendly planet.

If that fails, we might grab an image of it with the next generation of huge telescopes now being built around the world.

A GAME-CHANGER

Scientists say finding Proxima b focuses their research, saving them from “throwing darts randomly at the sky.” In fact, scientist Carole Haswell believes Proxima b may be the most important exoplanet ever found.

“How can you trump something that could be habitable orbiting around the very closest star to the Sun?” she says. ★

BREAKTHROUGH STARSHOT

A \$100-million project called ‘Breakthrough Starshot’ aims to send thousands of super-fast, mini-spaceships propelled by **lasers** to Alpha Centauri, the triple-star system that includes Proxima Centauri. Travelling at about 20 percent the speed of light – or a million times faster than a car on the highway – these one-gram ‘nanocrafts’ would reach Proxima b in about 20 years.

Is Starshot a crazy idea? It does face enormous technological challenges. Tiny spacecraft travelling at 60,000 kilometres per second would be damaged by any collision with gas or dust particles. Sending data from the spacecraft back to Earth would be difficult, too. The biggest hurdle will likely be building the super-powerful lasers to propel the spacecraft.

Yet, “These are solvable problems,” says Stephen Hawking, one of many big-name scientists backing the project. “These are not limitations set by the laws of physics. They are engineering problems. Engineering challenges tend, eventually, to be solved.” Stay tuned!

DEFINITIONS

ATMOSPHERE: the envelope of gases surrounding the Earth or another planet

LASER: a device that emits a very narrow and intense beam of light or other radiation

SOLAR FLARE: a brief powerful eruption of particles and intense electromagnetic radiation from a star's surface



ON THE LINES

Answer the following in complete sentences:

1. Explain what a **star** is.

2. Explain what a **planet** is.

3. Explain what it means for a planet to be in the Goldilocks zone?

4. Name the closest star to our solar system.

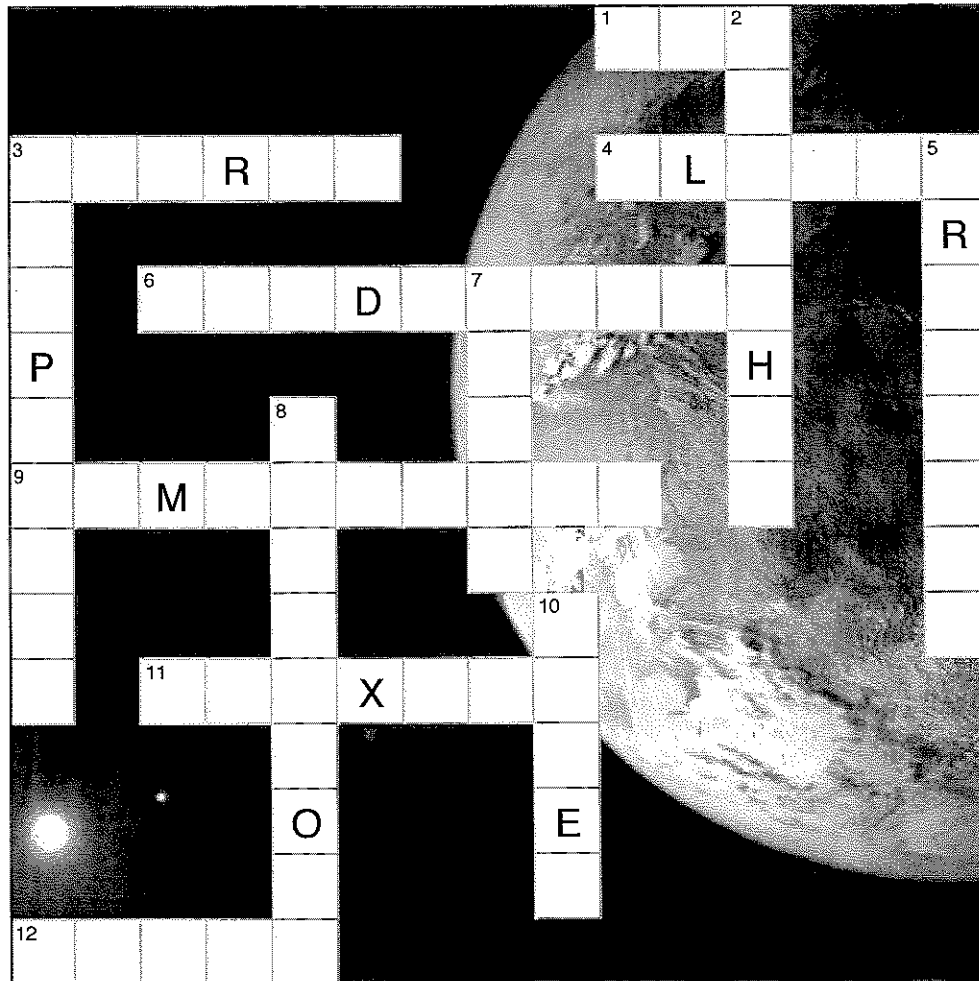
5. How far from Earth is this star?

6. What did scientists announce in late August regarding this star?

7. List at least three important facts about this planet.

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**ACROSS**

1. a star is a huge ball of _____ held together by gravity
3. a star's central core is very hot and produces _____
4. round object that orbits a star
6. _____ zone
9. the gases that surround the Earth
11. _____ Centauri is the closest star to Earth
12. _____ Way galaxy

DOWN

2. Breakthrough _____
3. a planet that orbits a star outside our solar system
5. Proxima b is 40 _____ kilometres from Earth
7. proposed propulsion source for tiny spaceships
8. the scientific study of stars, planets, and other objects in space
10. necessary for life and must be in liquid form